Amending Director's Order Number
1-218350098-A1

Director's Order

Amending Director's Order Issued To:

677075 Ontario Limited
1696 Bayview Ave
Toronto, Ontario, M4G 3C4
Canada

880188 Ontario Limited, carrying on business as "Burdock's Dry Cleaners"
180 Wortley Rd
London, Ontario, N6C 3P7
Canada

Sherry Marie Gouthro
Suite 2 - 1028 Commissioners Rd W
London, Ontario, N6K 1C3
Canada

Edward Leo Gouthro
Suite 410 - 10 Beechwood Pl
London, Ontario, N6C 1H7
Canada

Site:

180 Wortley Road
London, County of Middlesex
Ontario, N6C 3P7

Refer to the Definitions section in Part B of this Amending Director's Order, for the meaning of all the capitalized terms that are used in this Amending Director's Order.

PART A - WORK ORDERED

Pursuant to my authority under Sections 49 and 54 of the *Legislation Act, 2006*, S.O. 2006, c. 21, Sched. F and Sections 18, 196 and 197 of the EPA, I order you, jointly and severally, unless otherwise indicated, to do the following which, for ease of reference, replaces all the Work Ordered Items in the Director's Order 1-218350098 and includes

as described in Part B below, items that are not being amended and continue in full force and effect, or have already been complied with:

Item No. 1 **Compliance Due Date:** June 7, 2024

By June 7, 2024, retain a Qualified Person to conduct soil vapour monitoring, delineate the contamination from the Site and prepare and complete the written reports, as described in Work Ordered Item Nos. 3, 4, 5, 6 and 7 of this Order.

Item No. 2 **Compliance Due Date:** June 7, 2024

By June 7, 2024, submit to the Director via email to pierre.adrien@ontario.ca with a copy sent to the London District Office at environment.london@ontario.ca, written confirmation from the Qualified Person that they have (1) received a copy of this Order; (2) been retained to carry out the work specified in Work Ordered Item Nos. 3, 4, 5, 6 and 7 of this Order; and (3) the experience and qualifications to carry out the work.

Item No. 3 **Compliance Due Date**: July 8, 2024

By July 8, 2024, have a Qualified Person complete a soil vapour assessment as set out in the 2022 Technical Support Memorandum and address all other comments and recommendations in that report. The soil vapour assessment shall include, but not be limited to, re-sampling of all three existing soil vapour probes at the Site for the purpose of identifying and assessing the risk of PCE contamination being discharged to adjacent off-Site receptors.

Item No. 4 **Compliance Due Date**: July 8, 2024

By July 8, 2024, submit to the Director, by email to pierre.adrien@ontario.ca and to environment.london@ontario.ca, a written report, prepared by the Qualified Person, that includes the findings of the soil vapour assessment described in Work Ordered Item No. 3.

Item No. 5 **Compliance Due Date**: July 15, 2024

By July 15, 2024, submit to the Director, by email to pierre.adrien@ontario.ca and to environment.london@ontario.ca, a written plan, prepared by the Qualified Person, for the assessment of the soil and groundwater both on and off the Site, that includes at minimum, a description of the steps necessary to carry out all work described in Work Ordered Item No. 7, and timelines for carrying out the work.

Item No. 6 **Compliance Due Date:** July 29, 2024

By July 29, 2024, have the Qualified Person initiate an assessment of the soil and groundwater both on and off the Site in accordance with the written plan described in Work Ordered Item No. 5 of this Order, subject to any written comments on the plan received from the Director.

Item No. 7 **Compliance Due Date:** October 4, 2024

By October 4, 2024, submit to the Director, via email to pierre.adrien@ontario.ca and to environment.london@ontario.ca, a written report prepared by the Qualified Person that includes, at minimum, the following information:

a) the results of the completed assessment work described in Work Ordered Item No. 6 of this Order;
b) an assessment of the full vertical and lateral extent and the source(s) of any contaminants of concern, including but not limited to PCE and PCE associated derivatives.
c) a detailed interpretation of the hydrogeology of the Site and adjacent properties that may be impacted by contamination from the Site;
d) characterization of the interaction between the groundwater flow, the contaminant distribution, and any buried infrastructure both on and off the Site;
e) an assessment of potential adverse effects resulting from the off-Site discharge of contamination, including an assessment of potential adverse effects that may result from impacts to groundwater and soil vapour intrusion associated with PCE for off-Site receptors;
f) recommendations to prevent or eliminate any adverse effects that may result from the presence of contaminants in the subsurface at the Site and the discharge of any contaminants from the Site;
g) recommendations for monitoring contaminants that may result in an adverse effect on the Site and the discharge of any such contaminants from the Site; and

h) a detailed work plan with a detailed schedule for the implementation of any recommended remedial measures and monitoring contained in the report.

Item No. 8 **Compliance Due Date:** May 23, 2024

Upon service of this Order, before dealing with the Site in any way, the Orderees shall give a copy of this Order, including any amendments thereto, to every person who will acquire an interest in the Site as a result of the dealing.

Item No. 9 **Compliance Due Date:** May 23, 2024

Within thirty days of receipt of an acknowledgment and direction form signed by the Director enclosing a certificate of requirement, the Orderees shall register the certificate of requirement issued under s. 197(2) of the EPA on title to the Site in the appropriate Land Registry Office.

Item No. 10 **Compliance Due Date:** May 23, 2024

Within five days of registering the certificate of requirement on title, as required by Work Ordered Item No. 9 of the Order, the Orderees shall provide written verification to the Director by email to pierre.adrien@ontario.ca and to environment.london@ontario.ca that the certificate of requirement has been registered on title for the Site by providing a copy of the registered document and a copy of the parcel register for the property identifier for the Site.

Item No. 11 **Compliance Due Date:** May 23, 2024

Upon service of this Order, the Orderees shall permit access to the Site by Gary Howard Fine and Christopher Hercule Morin, and any person and equipment considered necessary, for the purposes of assessing contamination on and off the Site.

Item No. 12 **Compliance Due Date:** August 30, 2024

By August 30, 2024, have a Qualified Person prepare a written work plan (the Assessment Plan) to assess health risks associated with soil vapour intrusion caused by PCE-related contamination discharged from the Site, that includes, at minimum:

(a) a plan that addresses the recommendations in the 2024 Technical Support Memoranda;

(b) installing and sampling additional soil vapour probes at or near the locations described in recommendations 2 and 3 of the Harris Memo (as depicted in the map on page 6 of said memo);

(c) measuring indoor air concentrations in buildings located within 30 meters of the locations with high soil vapour measurements identified in the GHD Report (as identified in recommendation 2 of the Gandhi Memo); and

(d) a contingency plan for estimating the potential for soil vapour intrusion into indoor air consistent with the recommendations in the 2024 Technical Support Memoranda, if access to the buildings specified in item (c) cannot be obtained.

Item No. 13 **Compliance Due Date:** August 30, 2024

By August 30, 2024, submit to the Director, via email to pierre.adrien@ontario.ca and to environment.london@ontario.ca, a copy of the Assessment Plan.

Item No. 14 **Compliance Due Date:** September 4, 2024

By September 4, 2024, have the Qualified Person commence implementing the Assessment Plan, subject to any written comments that may be provided by the Director.

Item No. 15 **Compliance Due Date:** September 18, 2024

By September 18, 2024, submit to the Director, via email to pierre.adrien@ontario.ca and to environment.london@ontario.ca, a written report prepared by the Qualified Person that includes, at minimum:

a) a summary of the results of the work carried out in accordance with the Assessment Plan;

b) interpretation and comparison of the sample results to the applicable soil vapour and indoor air guidelines/standards, taking into consideration the property use, structural characteristics, and any other factors that could influence the sample results and/or risk level of each building within 30 meters of the location with high soil vapour measurements identified in the GHD Report; and

c) recommendations to prevent or eliminate any adverse effects that may result from soil vapour intrusion into indoor air.

PART B – DIRECTOR'S REPORT

This Amending Director's Order is being issued for the reasons set out below.

Definitions

For the purposes of this Amending Director's Order, the capitalized terms shall have the meanings set out in the previous order 1-218350098 with the addition or alteration of the following capitalized terms, if any, set out below:

"Amending Director's Order" means this Amending Director's Order Number 1-218350098-A1, as it may be amended.

"Assessment Plan" means the work plan required by Work Ordered Item 12, as it may be amended.

"2024 Technical Support Memoranda" means the Harris Memo and the Ghandi Memo.

"Director" means the District Manager of the MECP London District Office, or if he is unable to act, any other director with the MECP authorized to act pursuant to the EPA.

"Ghandi Memo" means the MECP technical review memorandum prepared by MECP London district engineer Nilima Gandhi, dated August 21, 2024.

"GHD Report" means the report entitled 'Groundwater and Soil Vapour Quality Investigation', dated August 13, 2024, prepared by GHD for Fasken Martineau DuMoulin LLP.

"Harris Memo" means of the MECP technical review memorandum prepared by MECP hydrogeologist Mark Harris, dated August 20, 2024.

"Qualified Person" means a person who meets the qualifications described in Section 5 of O. Reg. 153/04 and possesses hydrogeological expertise and experience in completing subsurface soil, groundwater, and soil vapour site assessments and indoor air monitoring; and implementing appropriate measures for site remediation and evaluating human and ecological risks associated with PCE contamination and its associated derivatives.

Reasons for Amending the Director's Order

On May 23, 2024, the original Order was issued to the Orderees to require the assessment of soil and groundwater contamination on and off the Site, including a soil vapour assessment to identify and assess the risk of PCE contamination being discharged to adjacent off-Site receptors. As of the date of this Amending Director's Order, the Orderees have failed to comply with the requirements of the Order.

In accordance with the MECP Compliance Policy Applying Abatement and Enforcement Tools, the Director chose not to name Gary Howard Fine and Christopher Hercule Morin in the Order as they agreed to voluntarily retain a qualified person to carry out certain assessment work to investigate soil vapour and groundwater contamination discharging from the Site.

On August 13, 2024, the MECP received a copy of the GHD Report, which summarizes the results of the voluntary assessment work. All soil vapour results within the GHD Report significantly exceeded the applicable health-based soil vapour criteria for PCE for commercial and residential buildings.

On August 16, 2024, Provincial Officer Nicole Does spoke to Mr. Gouthro on behalf of the Orderees to summarize the MECP's concerns with the sampling results in the GHD Report and advised Mr. Gouthro that further assessment work will need to be prioritized.

On August 19, 2024, Officer Does provided Mr. Gouthro with a copy of the GHD Report and advised that the MECP was carrying out a technical review of the report.

In the 2024 Technical Support Memoranda, MECP technical staff summarized their review of the GHD Report. This review indicated that, amongst other things, ground water flow across the Site is towards the Northwest direction, PCE concentrations exceeded the applicable standards in all groundwater monitoring wells on and off site, and, more significantly, soil vapour measurements for PCE and TCE were significantly higher than the results from previous sampling in January 2022. For example, offsite measurements of PCE in soil vapour were up to 245 times higher than the applicable residential standard and 15 times higher than the applicable commercial standard.

The 2024 Technical Support Memoranda also contained a number of recommendations to address the health risks associated with the high levels of contamination identified in the GHD Report.

On August 21, 2024, Officer Does requested the Orderees carry out a priority assessment of the risk associated with soil vapor intrusion caused by PCE-related contamination from the Site further to the recommendations included in the 2024 Technical Support Memoranda and provide a report to the MECP summarizing the findings by September 13, 2024.

Officer Does also requested the Orderees provide written confirmation by August 22, 2024, indicating whether the requested priority assessment work would be carried out.

On August 22, 2024, Mr. Gouthro stated in an email to Officer Does that he had contacted a qualified person to request a quote for undertaking the priority assessment work described in Officer Does' email sent on August 21, 2024. At this time the Orderees have not provided written confirmation that they will undertake the requested priority assessment work.

Mr. Gouthro reiterated that the Orderees may have financial constraints that prevents them from carrying out the requested assessment work and the Order requirements. The Orderees may provide the MECP with financial information to support any financial hardship submission, and the MECP may take this information into consideration when determining compliance actions. As previously noted in the Order, financial hardship or constraints are not grounds for removing an Orderee's name from an order.

Based on the results of the GHD Report and the 2024 Technical Support Memoranda, I believe that there is a significant risk to human health from potential vapour intrusion caused by PCE-related contamination from the Site. Accordingly, I am amending the Order to include the requirements to carry out the priority assessment work, as described further below.

I have added the following new defined terms: '2024 Technical Memoranda', 'Ghandi Memo', 'GHD Report', and 'Harris Memo' to refer to technical documents created since the Order was originally issued.

I have revoked a duplicate definition for "Director" to avoid confusion. For the sake of clarity, I have included the appropriate defined term for "Director" under the definition section above.

I have revoked and replaced the defined term for "Qualified Person" to include qualifications for indoor air monitoring, as follows:

> "Qualified Person" means a person who meets the qualifications described in Section 5 of O. Reg. 153/04 and possesses hydrogeological expertise and experience in completing subsurface soil, groundwater, and soil vapour site assessments and indoor air monitoring; and implementing appropriate measures for site remediation and evaluating human and ecological risks associated with PCE contamination and its associated derivatives.

The following lists all the Work Ordered Items set out above and describes the current status of each Work Ordered Item, including in the case of an item that is an amendment or addition, the reasons for such item amendment or addition:

- The work required by Work Ordered Item Nos 1, 2, 3, 4, 5, 6, 9 and 10 has not been completed by the Orderees within the specified compliance dates. The Orderees are still required to carry out the work required by these items.

- Work Ordered Item No. 7 has not yet been completed and remains in effect with a compliance date of October 4, 2024.

- Work Ordered Items No. 8 and 11 are ongoing requirements and remain in effect.

- Work Ordered Item No. 12 is a new requirement that has been added to require the Orderees to prepare an Assessment Plan to address the concerns and recommendations in the 2024 Technical Memoranda by undertaking assessment work to sample, monitor, and record the presence of contaminants discharged from the Site. The purpose of this plan is to assess the risk of human health impacts due to soil vapour intrusion caused by PCE-related contamination from the Site. This work is also important to confirm if soil vapour concentrations have declined at the Eastern property boundary of the Site.

  The Assessment Plan also includes a contingency plan to estimate soil vapour intrusion into indoor air if access to the buildings specified in Work Ordered Item No. 12(c) is not obtained. If the Orderees cannot obtain access to these buildings, the Orderees should immediately notify the Director or Officer Does.

- Work Ordered Item No. 13 is a new requirement that has been added to require the Orderees to submit the completed Assessment Plan to the Director. This is intended to provide the Director with the opportunity to review the Assessment Plan and make any necessary amendments. In the event the Assessment Plan is amended by the Ministry in any substantive respect which is not agreed to by the Orderees, this Order will be further amended to reflect the change(s) made by the Ministry.

- Work Ordered Item No. 14 is a new requirement that has been added to require the Orderees to implement the Assessment Plan, which is to take into account any written comments on the plan provided by the Director.

- Worked Ordered Item No. 15 is a new requirement and has been added to require the Orderees to provide a written report summarizing the results of work completed in accordance with the Assessment Plan; interpretation of the sample; and recommendations to prevent or eliminate any adverse effects that may result from soil vapour intrusion into indoor air.

It is the Ministry's expectation that any future delineation work completed in accordance with the requirements of the Order will take the results of this assessment into account.

Lastly, I am attaching the 2024 Technical Support Memoranda as Attachment A to the Amending Director's Order, which forms part of this order.

A copy of this Amending Director's Order should be kept with the original Order, and copies of both the Order and the Amending Director's Order should be provided together, including any attachments.

ISSUING DIRECTOR

Name: Pierre Adrien
Job Title: District Manager
Badge Number: 2074
Address: 733 Exeter Road, London, Ontario, N6E 3T1
Director Email: pierre.adrien@ontario.ca
Office Email: environment.london@ontario.ca
Date: August 23, 2024

Signature: 

APPEAL TO THE ONTARIO LAND TRIBUNAL INFORMATION

REQUEST FOR HEARING

You may require a hearing before the Ontario Land Tribunal if, within 15 days of service of this Amending Director's Order, you serve written notice of your appeal on the Ontario Land Tribunal and the Director as indicated in the Contact information below. Your notice of appeal must state the portions of this Amending Director's Order for which a hearing is required and the grounds on which you intend to rely at the hearing. Unless you receive leave (permission) from the Ontario Land Tribunal, you are not entitled to appeal a portion of this Amending Director's Order or to rely on grounds of appeal that are not stated in the notice of appeal.

CONTACT INFORMATION

The contact information for the Director and the Ontario Land Tribunal is the following:

Registrar
Ontario Land Tribunal
655 BAY STREET, SUITE 1500
TORONTO, ON M5G 1E5
Email: OLT.Registrar@ontario.ca

and

Director
Ministry of the Environment, Conservation and Parks
London District Office
733 EXETER RD
LONDON, ON N6E 1L3
Office Email: Environment.London@ontario.ca
Fax: (519) 873-5020

The contact information of the Ontario Land Tribunal and further information regarding its appeal requirements can be obtained directly from the Tribunal at:

Tel: (416) 212-6349, Toll Free: 1(866) 448-2248 or www.olt.gov.on.ca

SERVICE INFORMATION

Service of the documentation referred to above can be made personally, by mail, by fax (in the case of the Director only), by commercial courier or by email in accordance with the legislation under which this Amending Director's Order is made and any corresponding Service Regulation.

ADDITIONAL INFORMATION

Unless stayed by the Director or the Ontario Land Tribunal, this Amending Director's Order is effective from the date of service.

Failure to comply with a requirement of this Amending Director's Order constitutes an offence. Unless otherwise indicated, the obligation to comply with a requirement of this Amending Director's Order continues on each day after the specified compliance date until the obligation has been satisfied.

The requirements of this Amending Director's Order are minimum requirements only and do not mean that you are not required to comply with any other applicable legal requirements, including any:

- statute, regulation, or by-law;
- federal, provincial, or municipal law; or
- applicable requirements that are not addressed in this Amending Director's Order.

The requirements of this Amending Director's Order are severable. If any requirement of this Amending Director's Order, or the application of any requirement to any circumstance, is held invalid, such finding does not invalidate or render unenforceable the requirement in other circumstances. It also does not invalidate or render unenforceable the other requirements of this Amending Director's Order.

Further orders may be issued in accordance with the legislation as circumstances require.

This Amending Director's Order is binding upon any successors or assignees of the persons to whom this Amending Director's Order is issued.

The procedures to request a hearing and an appeal of this Amending Director's Order and other information provided above are intended as a guide. The legislation should be consulted for additional details and accurate reference. Further information can be obtained from e-Laws at www.ontario.ca/laws.

ATTACHMENTS

Attachment A – 2024 Technical Support Memoranda

Ministry of the Environment, Conservation and Parks
Drinking Water and Environmental Compliance Division
Southwest Region

733 Exeter Road
London ON N6E 1L3
Tel.: 519 873-5000
Fax: 519 873-5020

Ministère de l'Environnement de la Protection de la nature et des Parcs
Division de la conformité en matière d'eau potable et d'environnement
Région du Sud-Ouest

733 rue Exeter
London ON N6E 1L3
Tél.: 519 873-5000
Téléc.: 519 873-5020

Ontario

August 21, 2024

MEMORANDUM

To: Nicole Does
Senior Environmental Officer
London District Office

From: Nilima Gandhi
District Engineer
London District Office

RE: August 2024 Investigation Report – 180 Wortley Road, London, Ontario
Review of soil vapour results from a human health risk perspective

---

As requested, I reviewed the Groundwater and Soil Vapour Quality Investigation Report prepared for the property located at 180 Wortley Road, London, Ontario by Fasken Martineau DuMoulin LLP dated August 13, 2024. This review is limited from a perspective of potential human health risk due to the exposure high levels of contaminants reported in the soil vapour samples. A companion memo by Mark Harris provides a deeper hydrogeological review of groundwater and soil vapour contamination and their implications, as well as recommendations on next steps for this Site.

Background

Briefly, the property at 180 Wortley Road is about 0.12 hectares (0.31 acres) in size and contains a commercial building located centrally on the Property. The Site has been investigated for groundwater and soil vapour contamination that could have occurred due to a spill or release of tetrachloroethylene (PCE), a chemical that is commonly used in the dry-cleaning business, that has been in operation since 1962 at this Site. The breakdown products of tetrachloroethylene (PCE) include trichloroethylene (TCE), dichloroethylene (DCE), and vinyl chloride (VC). These products result from the natural degradation of PCE, often facilitated by microorganisms in groundwater under certain conditions.

Human health impacts of exposure to PCE and its breakdown products are often severe. PCE is considered a probable human carcinogen, with evidence suggesting an increased risk of cancers such as bladder cancer, non-Hodgkin lymphoma, and multiple myeloma. Exposure to PCE exposure can result in symptoms like headaches, dizziness, nausea, and in severe cases, unconsciousness. Chronic, long-term exposure may lead to liver and kidney damage, as well as cardiovascular effects.

Several significant other health risks include neurotoxicity, reproductive and developmental effects, as well as respiratory and skin irritation.

Trichloroethylene (TCE) is classified as carcinogenic to humans, with strong evidence linking it to kidney cancer, liver cancer, and non-Hodgkin lymphoma. TCE exposure may also result in neurobehavioral performance deficits and mood changes, such as depression and anxiety, and may impair immune system function contributing to autoimmune diseases.

Vinyl chloride (VC) exposure can also pose several significant health effects. VC is classified as a known human carcinogen and is strongly linked to liver cancer (particularly angiosarcoma), lung and brain cancer, lymphoma, leukemia, and breast cancer.

A brief summary of previous (pre-2024) environmental investigations conducted at the Site and their interpretations, in terms of assessing groundwater contamination levels of PCE and its breakdown products, have been described in the companion memo. This memo only focuses on the recent measurements of groundwater and soil vapour concentrations of PCE and its products, as investigated in the above-mentioned report.

Results of Recent Investigation

The purpose of the recent site investigation conducted by GHD was to further examine the groundwater and soil vapour quality, both on and off-Site. The investigation included the installation of two monitoring wells and two soil vapour probes, collection of soil samples from select locations, and collection of groundwater and soil vapour samples from select existing and newly installed monitoring wells and probes, respectively. All field work, including samples collection, was completed in July 2024.

The following is a summary of results from the recent investigation conducted at the Site:

- **Groundwater flow direction:** Groundwater flow across the site and adjacent properties is considered to flow towards the northwest direction based on measured groundwater levels.

- **Levels of contaminants in groundwater:** PCE concentrations exceeded the Site Condition Standard (SCS) of 1.6 µg/L in all monitoring wells sampled both on and off-site. Levels ranged from 35.5 µg/L at MW04, north of the 180 Wortley Road building, to 523 µg/L at MW1-24, located off-site to the west. Higher concentrations were generally found on the western portion of the site and off-site to the west of Wortley Road. Having said that, the lateral extent of PCE impacts to groundwater are not fully defined to the northwest and west of the Site. Details of groundwater results and their potential impacts are discussed by Mark Harris in the companion memo.

- **Levels of contaminants in soil vapour:** The soil vapour measurements for PCE and TCE were found significantly higher than the results from the sampling event in January 2022. Levels of PCE were reported at concentrations above the Soil Vapour Criteria for Residential (214 µg/m^3) and Commercial (3,438 µg/m^3) properties. The highest concentration of PCE was measured at 52,800 µg/m^3 at SVP-4 located in the northwest corner of the property on

Site, followed by 38,400 µg/m^3 at SVP-1 and 16,000 µg/m^3 at SVP-2 – both probes are located north of the building on Site. The off-Site measurement of PCE in soil vapour at SVP-5, located west across the Wortley Road, was also reported at 10,100 µg/m^3. These measurements are up to 245X higher than the residential and 15X higher than commercial standards.

TCE was also detected at concentrations above the Commercial Soil Vapour Criteria of 100 µg/m^3 at two locations SVP-1 (288 µg/m^3) and SVP-4 (121/115 µg/m^3), which are located north and northwest of the Site building respectively. Measured levels of TCE at all four locations (range: 28.3 – 288 µg/m^3) were above the Residential Soil Vapour Criteria of 13.6 µg/m^3.

Discussion and Recommendations

Several of the immediate and long-term concerns associated with the high levels of PCE and TCE found in the recent investigations have been documented by Mark Harris in his memo. This section only expands on the human health risk associated with high levels of PCE and TCE, mainly reported for the soil vapour measurements.

Two important factors, inherent toxicity of a chemical (ability to cause adverse health effects) and its exposure levels (contaminant concentration and duration of exposure), are combined to assess the human health risk (risk α toxicity & exposure). As described earlier, the human health effects of both PCE and TCE can be severe and hence both chemicals score very high on the scale of inherent toxicity. When the estimated level of exposure is also scored high, then the risk assessment would recommend immediate actions to protect the human health.

Based on the recent soil vapour results, there is a high potential of PCE and related degradation products to migrate into indoor air of nearby properties, specifically located to the north and northwest. It has been reported that the surrounding land uses include commercial/residential units (174 and 176 Wortley Road) in north, commercial (a grocery store at 179 Wortley Road) and its adjacent residential units in west, as well as a multi-tenant commercial building (190 Wortley Road) located south of the Site. Many of the buildings located immediately north and west of the Site appear to be former residential homes that are currently commercial use. There is also a basement at the 176 Wortley Road property located immediately north of the Site. The knowledge of the type of occupancies surrounding the Site is an important factor in exposure assessment. For example, residential buildings generally have lower air exchange rates compared to commercial units, which can lead to higher concentrations of contaminants indoors if vapour intrusion occurs. More specifically, basements have a higher chance of vapor intrusion due to several factors. Hence, a clear understanding of types of building use is essential in assessing exposure to contaminants (also see Recommendation #5 in the companion memo).

While assessing exposure levels of contaminants for nearby residential/commercial properties, the following multiple lines of evidence are considered:

- high concentrations of contaminants (PCE and its degradation products) measured in groundwater and sub-surface samples collected from both on and off-Site locations suggest there is a considerably high magnitude and spread of contamination,
- direction of the groundwater flow and recently measured groundwater concentrations of contaminants also suggest the potential migration of the plume from its origin,
- the presence of residential/commercial occupancies within 30 meters of the locations from the plume (when known, in this case from where high soil vapour concentrations are measured),
- the knowledge of expanding or moving contamination zone in the direction of residential/commercial units in this case in north and northwest directions,
- the movement of the plume is often considered more relevant when a plume also has the potential to migrate to within a 30 m radius of more residential/commercial properties in the future (here in further west direction across Wortley Road),
- the presence of below ground utility conduits, tree roots and other such factors in the path of plume that facilitate movement of contaminants into indoor spaces, and
- when human exposure pathway to these contaminants is considered complete.

Based on the available information for the Site, majority of the above lines of evidence indicate a potentially high health risk from exposure of the inherently toxic chemicals like PCE and TCE. The following next steps are to be considered in a relatively short-term to address this concern:

1. **Risk Characterization** – This step is essential in confirmation of risk via vapour intrusion pathway assessment, which focuses on the risk posed due to the inhalation of chemical vapour in indoor air arising from subsurface contamination. The presence of high levels of contaminants (PCE and TCE) may not directly dictate similarly high levels of these chemicals in the indoor air and often depend on several site-specific factors that affect the movement of sub-surface vapour into indoor air. Therefore, the vapour intrusion assessment includes one or more of the following assessments to characterize concentrations of contaminants in indoor air:

    I. **Measure indoor air concentrations:** Indoor air quality testing is possibly a more direct and effective way to estimate magnitude of exposure from vapour intrusion under any of the following conditions: (a) there is potential for health risks to be above acceptable levels as predicted from soil vapour and/or groundwater data; (b) the contamination source is very close to or in contact with the building; or (c) there are preferential pathways for vapour migration (e.g., utilities and drains). Presence of these factors at this Site strongly suggest for the indoor air sampling of properties that are within at least 30 m of the known high soil vapour measurement locations. As discussed earlier, two residential properties located immediately north of the Site (176 Wortley Road and 174 Wortley Road) are in the closest proximity of the highest soil vapour measurements, and therefore are ideal locations for indoor air sampling. This recommendation also coincides with what Mark Harris has proposed for indoor air sampling in his memo (Recommendation #4).

Considering that the highest concentration of PCE (52,800 µg/m^3) was measured at SVP-4 (northwest corner of the Site), properties located in west across the Wortley Road also fall within 30 m of this location and can also be good candidates for the indoor air sampling. Having said that, the grocery store (ValuMart) across the street possibly has a slab-on-grade structure that acts as a physical barrier that can prevent or significantly reduce the entry of chemical vapours from the subsurface into the building. Also, other potential vapour contributions from indoor and/or outdoor sources in a commercial building like this may interfere with the measured concentrations and cannot be ignored.

II. **Measure sub-slab vapour concentrations:** Alternatively, indoor air concentrations can also be predicted from measured sub-slab vapour concentrations using mathematical models. Having said that, installing sub-slab probes can be invasive and disruptive, as it requires drilling through the building slab. This process can be complex, especially in occupied buildings, and may lead to structural concerns or require repairs. The presence of subsurface structures or utilities can also affect vapour distribution and lead to inaccurate measurements. Although, not ideally recommended, this option may be considered when direct indoor air sampling is not possible or preferred.

III. **Measure soil vapour concentrations closer to buildings:** In absence of direct indoor air sampling, air concentrations can also be estimated from soil vapour concentrations measured closer to buildings. Soil vapour sampling is generally less intrusive, cost effective and often conducted first to identify potential vapour intrusion issues and to determine which buildings may need further investigation. In cases where indoor air sampling can be complicated by the presence of indoor sources of contaminants, such as consumer products or building materials, soil vapour sampling provides a clearer picture of subsurface contamination. Since properties located west of the Site and across the Wortley Street may pose challenges in measuring indoor air concentrations due to the presence of such confounding factors, it would be advisable to first conduct the soil vapour assessment for locations closer to these buildings. This is further elaborated by Mark Harris in his memo (Recommendations #2, 3, and 6)

IV. **Measure groundwater concentrations:** Since the contaminated groundwater can be a source of vapour in affected areas, a clear understanding of groundwater contamination is critical to determine the location of the plume and maximum concentrations in order to delineate the full extent of contamination. The need for this assessment along with recommended timeline is explained in much greater details in the companion memo (Recommendations # 6, 7, and 8)

2. **Risk communication** – Informing affected parties about potential risks is a crucial aspect of risk management, ensuring that everyone is aware and able to take appropriate actions. Health authorities, in case of residential properties, and Ministry of Labour, for commercial

properties, should be informed immediately of the presence of high levels of PCE and TCE measured in soil vapour (along with the report) and the potential health risks associated with their exposure (also Recommendations#1, 5 in the companion memo). It is recommended to work with these authorities to develop a communication strategy that informs the occupants of the nearby buildings about the potential risks, the steps being taken to address the situation, and any protective measures they should consider. Additional guidance can also be provided on minimizing exposure, such as improving ventilation and avoiding the use of area for a prolonged period when possible.

3. **Risk Mitigation & Monitoring:** When the actual human health risk is confirmed through presence of one or more lines of evidence as discussed in Risk Characterization above, it is essential to explore both short-term and long-term strategies for reducing/preventing exposure to chemicals like PCE and TCE. Short-term strategies often include increasing ventilation in affected buildings to dilute indoor air concentrations. This can be achieved through mechanical ventilation systems or by using air purifiers with activated charcoal filters. Installing vapour mitigation systems also prevent vapour from entering indoor spaces by creating positive pressure barrier. Although these strategies are helpful in reducing exposure, eliminating the source of contamination (through remediation) in a long-term would provide greater benefits. Remediation strategies to reduce PCE and TCE concentrations in soil and groundwater often incorporate soil vapour extraction and air sparging methods. And finally, regular monitoring of indoor air and soil vapour should be conducted to ensure that elimination/prevention efforts are effective, and that vapour intrusion is controlled. Since the actual risk to human health is currently not quantified for this Site, it is futile to have a further discussion of risk mitigation at this time.

Summary

Based on my review of the recently reported measurement of PCE and TCE in groundwater and soil vapor samples collected from on Site and off-Site locations, I recommend the following action items immediately:

1. The local health authorities and Ministry of Labour should be informed of the situation along with the potential to cause human health risks. A risk communication plan is to be prepared to inform all affected parties in collaboration with these authorities.
2. A tiered approach to addressing this contamination should first focus on assessing the actual risk to human health by measuring actual concentrations of PCE and TCE in indoor air of adjacent buildings located north of the Site (176 Wortley and 174 Wortley Road). For buildings located in northwest direction across the street, soil vapour measurements closer to building structures may be preferred that would aid in further identifying locations for detailed exposure/risk assessments. More guidance on selection of locations for additional soil vapour sampling is provided by Mark Harris in his memo and can be further discussed.

Depending on the results of the investigations carried out in the first tier, the second tier may focus on either further characterizing the human health risks in additional buildings near the Site and/or to delineate the extent of contamination through groundwater measurements. At this stage, it is too early to predict which direction the second tier will take.

Should you have any questions, comments or require further information, please contact me at nilima.gandhi@ontario.ca.

Nilima Gandhi, Ph.D., P.Eng., FEC
District Engineer
London District Office

CC: Pierre Adrien, London District Manager

Limitations: *The purpose of the preceding review is to provide advice to the Ministry of the Environment, Conservation and Parks regarding potential adverse impacts based on a review of the information provided in the above referenced documents. The conclusions, opinions and recommendations of the reviewer are based on information provided by others, except where otherwise noted. The Ministry cannot guarantee that the information that is provided by others is accurate or complete. A lack of specific comment by the reviewer is not to be construed as endorsing the content or views expressed in the reviewed material.*

Ministry of the Environment, Conservation and Parks

733 Exeter Road
London ON N6E 1L3
Tel': 519 873-5000
Fax: 519 873-5020

Ministère de l'Environnement, de la Protection de la nature at des Parcs

733, rue Exeter
London ON N6E 1L3
Tél.: 519 873-5000
Fax: 519 873-5020

MEMORANDUM

TO: Nicole Does
Senior Environmental Officer
Ministry of the Environment, Conservation and Parks
London District Office

FROM: Mark Harris, P.Geo
Hydrogeologist
Ministry of the Environment, Conservation and Parks
Southwest Region

DATE: August 20, 2024

RE: Wortley Rd CVOC Occurrence
August 2024 Report prepared for 180 Wortley Rd
Review of impacts to ground water resources

I have reviewed the August 13, 2024 letter-report prepared by GHD for the 180 Wortley Rd property, located in central London. This was prepared for Fasken Martineau DuMoulin LLP, which represents a previous owner of this property. My review was limited to consideration of impacts to ground water resources and function.

Background:

A dry-cleaning facility has operated at the 180 Wortley Rd property for several decades. The ministry's London District office, supported by the Southwest Region Technical Support Section, has reviewed and commented on several reports regarding ground water and soil vapour data at this site. Our current understanding is that a release of dry-cleaning chemicals at this property has contaminated local ground water. The primary contaminant of concern is tetrachloroethylene (PCE), which is widely used in the dry-cleaning industry.

Even in an urban environment, where ground water is not used for drinking water purposes, this type of contamination can present a potential risk to human health. Vapours can volatilize from some organic contaminants in ground water, and then migrate upward through the unsaturated zone towards the surface. In some cases, they can enter the basements of buildings and pose a health risk from inhalation if the concentrations are sufficient.

Several reports prepared over the past few years have presented results of subsurface investigation at both 180 Wortley Rd and 190 Wortley Rd. An additional report that was prepared on Feb 3, 2022 for the current property owner at 180 Wortley Rd provided results from sampling at vapour probes on that property. These earlier investigations showed that concentrations of PCE in ground water at both sites exceeded the site condition standards (1.6 μg/L). Concentrations of PCE in soil vapour were measured to be below the Commercial Soil Vapour Criteria (3 438 $\mu g/m^3$).

Following my review of these documents, I recognized that the facility has been in place for several decades, and that we have no idea how long ago (or for how long) a release of dry-cleaning chemicals occurred. I also recognized that the presence of a sandy aquifer at shallow depth meant that there may be an active ground water flow system. I was concerned that these two factors may have combined to generate a contaminant plume that is significantly larger than what has been investigated to date. Based on my experience at other sites impacted by similar contaminants, I was also concerned about the potential for temporal and spatial variability in the concentrations of PCE in soil vapour.

As a result, I had recommended several 'next steps' so that we could better understand the scope of the contamination. The previous property owner agreed to these recommendations, which included:

- Installation of additional wells further down-gradient from the subject property, on the far (west) side of the Wortley Rd road allowance. This would help us to gain confidence in the ground water flow direction. It would also help us to understand whether the contamination is likely limited to the immediate property area or is more likely to extend further off-site.
- Installation of a new soil vapour probe associated with one of the new wells to be constructed. This would demonstrate whether soil vapour concerns existed further off-site. Installation of a second soil vapour probe on the northwest corner of the 180 Wortley Rd property. This would give us further confidence about soil vapour conditions along the boundary between 180 and 176 Wortley Rd.
- Resampling of a subset of most of the existing monitoring wells. It was agreed that some of the existing well network was redundant.
- Resampling of the existing soil vapour probes.
- Monitoring of water levels in all wells, accompanied by a topographic survey. This would give more confidence in the ground water flow direction.

Recent Results and Interpretation:

The August 13, 2024 report was prepared by GHD for a previous owner of the 180 Wortley Rd property. This provided new insight on ground water flow, as well as contaminant concentrations in ground water and soil vapour.

- Water level measurements reinforced the assertion that ground water flow is primarily to the west, with a northwest component.
- The spatial distribution of PCE concentrations in ground water obtained from the existing wells was generally unchanged from previous results. Wells that previously returned samples with elevated PCE concentrations continued to do the same. Wells that previously showed areas with little to know PCE contamination also showed the same result. In many wells, there was evidence of a modest decline in PCE concentrations over time.
- The two new wells installed on the down-gradient (west) side of Wortley Rd exhibited elevated concentrations of PCE. One well (MW1-24) exhibited the highest PCE concentration (523 μg/L) measured in groundwater for this recent sampling round.
- Soil vapour samples from all vapour probes exhibited much higher concentrations than the previous round of sampling. Sampling in 2022 returned results that were 0.24 and 0.50 times the Soil Vapour Criteria. In contrast, the August 13, 2024 report showed concentrations that were 2.9, 4.6, 11.1 and 15 times the Soil Vapour Criteria. (One of the soil probes sampled in 2022 could not be sampled).

As I postulated earlier, I am concerned that we are currently only looking at a portion of a contaminant plume. It may extend well beyond Wortley Rd. The newly installed wells are the furthest down-gradient from the site and do not show evidence of a declining trend in concentrations over distance. The apparent modest decrease in PCE concentrations over time at some wells may be evidence of contaminant attenuation. But it may also be evidence of a seasonal effect, or perhaps shows the normal variability associated with this sort of assessment.

Of greater concern are the recent results for soil vapour. These new measurements show that PCE concentrations in soil vapour now significantly exceed the Soil Vapour Criteria. What is further concerning is that three of the four probes are in very close proximity to an off-site structure (176 Wortley Rd). It is my opinion that the ministry should proceed with the conclusion that there is a risk to indoor air quality.

The recent vapour results also call into question an assertion that had been made in previous meetings. It was suggested that the building next to the 180 site theoretically faced the highest risk, due to its proximity to the dry-cleaning facility. It was argued that if it could be shown that there was no unacceptable risk to this property, all other properties would also have little risk due to their more distal locations.

The recent data cannot be used to show that the 176 Wortley Rd property is not at risk. It is important to recognize that the much higher concentrations presented in soil vapour are associated with concentrations in ground water that are similar to previous measurements. This supports my opinion that there can be much spatial and temporal variability in soil vapour.

This implication is that a plume that travels further west beyond Wortley Rd ***may*** also pose a risk to indoor air in other buildings located at greater distance.

Recommendations:

1. The recent results and proximity to nearby structures are grounds to require a more detailed evaluation into the potential for vapour intrusion into indoor air. The local Health Unit should be notified in short order about the new results and about the ministry's increased level of concern. In addition, the Ministry of Labour should also be notified given that the nearest buildings are commercial in nature.

   Clarification: The presence of high concentrations of VOC in soil vapour does not necessarily equate to unacceptable indoor air quality. But the concentrations in soil vapour are sufficiently high that additional investigation is necessary in the near-term.

2. Additional soil vapour probes should be installed in the near-term. We now know that concentrations in soil vapour are significantly elevated but have no information regarding the spatial extent of vapour impact. Since the buildings in this area are in close proximity to each another, vapour intrusion may become a concern at more than just the 176 Wortley Rd property.

   For ease of access, it may initially be preferable to install vapour probes in the road right-of-way. As a start, probes should be installed at the following locations:

   a. On the east side of Wortley Rd, in front of the 176 Wortley Rd property.
   b. On the east side of Wortley Rd, in front of the 174 and 174 ½ Wortley Rd property.
   c. On the west side of Wortley Rd, in front of the 175 Wortley Rd property.
   d. On the west side of Wortley Rd, in front of the 173 Wortley Rd property.

3. An additional soil vapour probe should be installed at the back (east) end of the 180 Wortley Rd property. It is less unlikely that vapour impact will reach the residential properties that front Marley Place to the east. This is because these homes are up-gradient and at least 50 m from the dry cleaning facility. Nevertheless, it is important to show that vapour concentrations have declined substantially at the eastern property boundary. Should it become necessary to respond to community concerns, a data point showing a lack of impact in this direction would be of very high value. If concerning concentrations are found at this probe, additional work would be necessary.

   Using this same reasoning, another probe should be installed at the back (east) end of the 190 Wortley Rd property. Even though we suspect that the 180 Wortley Rd property is the source of the contamination, significant ground water contamination occurs in the northwest portion of the 190 Wortley Rd property. I recommend the installation of a probe close to the east property line, about 30 m south of the northern property line.

4. It is my opinion that the situation is such that indoor air could be at risk. The evaluation of human health impacts due to indoor air quality is beyond my scope of expertise. Thus, the District Engineer should be engaged, and an indoor air sampling strategy should be considered in short order. I will defer to the District Engineer's expertise in the identification of properties to be evaluated.

   I would caution that indoor air sampling should be conducted only where we are certain that elevated concentrations of VOC are present in soil vapour in the area of the building in question. If indoor air sampling is to proceed at one or more properties, it may become desirable to install additional soil vapour probes on the property(ies) in order to support the evaluation of indoor air impact.

   Note that the structure at 176 Wortley Rd property is very close to the impacted vapour probes. I would point out that the next building to the north (174 ½ Wortley Rd) is only 17 m from the same probes. Thus, even if the building at 176 Wortley Rd did not exist, the structure at 174 Wortley Rd would generally be close enough for us to be concerned about potential vapour impact.

5. My examination of MPAC land use data suggests that some of the buildings in the area may also include residential units. This includes 171, 174 and 174 ½ Wortley Rd. The building at 169 Wortley Rd is coded as residential. I recommend that the status of residential use at each of these buildings be confirmed.

6. The distribution of contaminants in ground water generally controls the distribution of contaminants in soil vapour. This is why it is typical practice to first understand the extent of contamination in ground water.

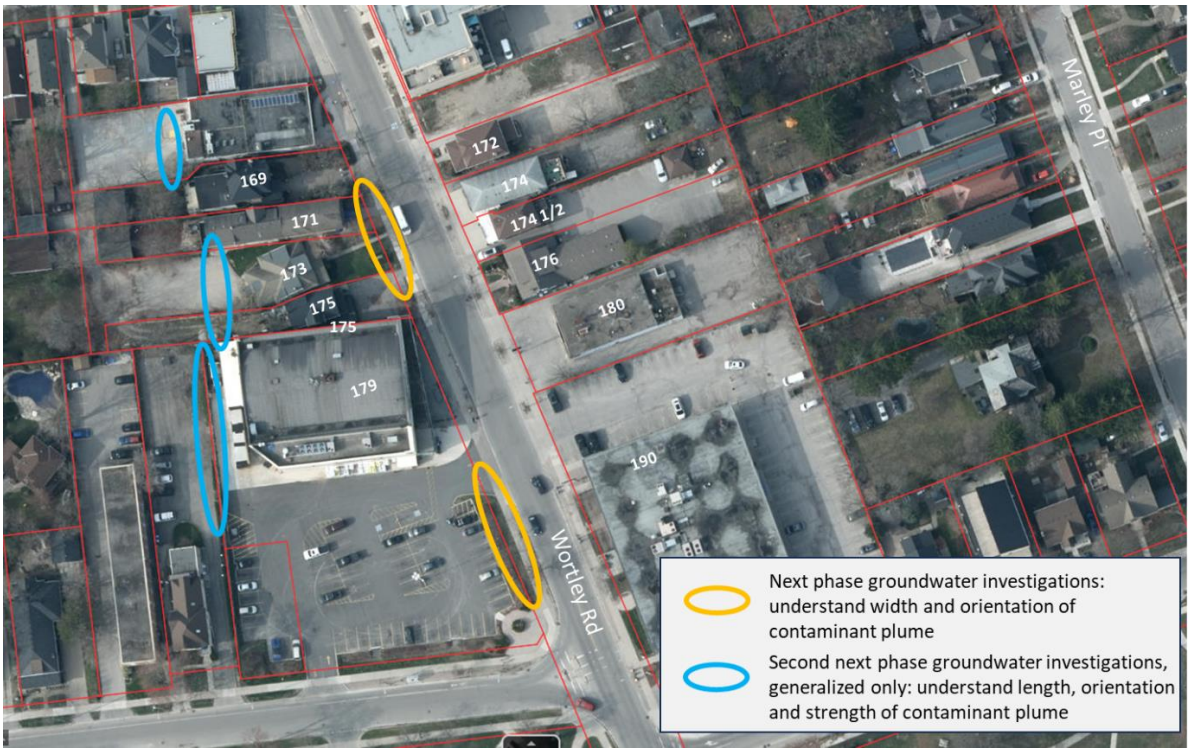
   At this site, however, exposure to soil vapour is generally the main risk pathway. In situations like this it can be more efficient to focus effort and resources on evaluating soil vapour, even before a full understanding of the distribution of ground water impact. Given the known presence of elevated concentrations in vapour and the presence of nearby structures with basements, it would be acceptable for the first phase of future work to focus on soil vapour.

7. Notwithstanding the above, at some point additional delineation of impacts to ground water will be required. We currently have no information to identify the extent of ground water contamination. As discussed, I am concerned that a lengthy contaminant plume may have developed. It may continue beyond (west of) the grocery store building on the west side of Wortley Rd.

   Consideration should be given to a plan to install additional ground water monitoring wells beyond the grocery store. A sizeable parking lot behind (west of) the grocery store would provide opportunity for drilling. A similar parking lot behind the buildings to the north (173 and 175 Wortley Rd) also provides opportunities. Note that these parking lots are only 60 m down-gradient from the newly installed wells. This is the same distance between the newly installed wells and the most up-gradient impacted wells on the 180 Wortley Rd property. In other words, it is not unreasonable to question whether impacts continue behind (west of) the grocery store.

   The location of additional monitoring wells should be selected based on our understanding of the ground water flow direction. As the distance from the existing monitoring wells increases, our confidence in the ground water flow direction is reduced. Water level data that are obtained from the new wells may result in the need for additional wells at a later date.

8. Additional ground water monitoring wells will also eventually be needed further north and further south along Wortley Rd. This recommendation, which was originally advanced some time ago, is to allow us to understand the full width of the contaminant plume. I suspect that the plume is not much wider than the property. But given the ability of DNAPL contaminants to spread when penetrating the subsurface, this lateral delineation is necessary.



9. The mitigation of impacts to indoor air quality is beyond my area of expertise. For discussion purposes only, I recommend that all parties recognize that mitigation in this type of scenario often takes the form of sub-slab depressurization or air exchange. It would be inappropriate to recommend mitigation of a problem that has not yet been demonstrated to exist.

   But perhaps there are low-cost ventilation methods that could be implemented in the near-term as a pro-active means of protecting human health. Ie. it may take some time for the project to properly progress through the comprehensive study that is needed to establish whether there is a soil vapour-to-indoor air pathway. Is it appropriate to recommend that property owners consider installing additional ventilation during this period?

This memo includes recommendations for further site evaluation. The nature of these types of investigations is that there is often a need for additional work (or modifications) once new data are obtained.

At this point, it is my opinion that it is a first priority to evaluate the potential for soil vapour intrusion into indoor air in buildings closest to the 180 Wortley property. Of equal importance is the need to understand the extent and nature of VOC in soil vapour in the immediate area. A second phase of investigation should be to evaluate the extent of groundwater contamination. At some distance from the contaminant source, the risk to receptors will decline to a point where it is no longer a concern. At this point, we don't know where that point lies.

Please contact me if you have any questions.

Sincerely,

Mark Harris, P.Geo.
Hydrogeologist
Technical Support Section
Southwestern Region